Listing of Claims

1. (Currently Amended) An ATM-based device comprising:

a data transmitter including

a transmission data storage unit configured to store data received from a calculation processing module;

a cell generator configured to divide a message stored in the transmission data storage unit into a predetermined amount of data, to combine the data using Virtual Path Identifier/Virtual Channel Identifier (VPI/VCI) information attached to the message to generate at least one ATM cell; and

a cell transmitter configured to transmit the at least one ATM cell generated at the cell generator to an ATM switch module; and

a data receiver including

a cell receiver configured to receive the at least one ATM cell switched by the ATM switch module;

a memory controller configured to control storage of the at least one ATM cell received by the cell receiver to a corresponding cell buffer according to a cell buffer identifier;

a memory configured to store the at least one ATM cell;

a data restoring unit configured to retrieve the at least one ATM cell using the cell buffer identifier and to restore the message; and

a receiving data storage unit configured to store the message restored by the data restoring unit.

2. (Canceled)

3. (Original) The device according to claim 1, wherein a cell header coupled to each of the data comprises PT information representing whether or not the divided data is the last data of the message.

4. (Original) The device according to claim 1, wherein the cell generator divides the data using a read counter initialized according to message length information attached to the message.

5. (Currently Amended) The device according to claim 1, wherein the cell generator is configured to change ~~set~~ PT information of the ~~corresponding~~ ATM cell to [[1]] when a read counter is a predetermined minimum value [[0]].

6. (Currently Amended) The device according to claim 1 [[2]], wherein the memory comprises:

a linked cell buffer configured to store one ATM cell and an identifier to a next linked cell buffer for each cell buffer identifier;

a free cell buffer identifier queue configured to store at least one cell buffer identifier indicating an empty linked cell buffer;

a receiving state table including information used in classifying and managing the ATM cell according to the VPI/VCI; and

a receiving completion state queue configured to copy a portion of information of the receiving state table which is updated when all the ATM cells comprising one message are stored.

7. (Original) The device according to claim 6, wherein the receiving state table includes at least one of receiving permission information, cell number information, start cell buffer identifier information, and last cell buffer identifier information.

8. (Original) The device according to claim 6, wherein the receiving completion state queue includes at least one of cell number information and start cell buffer identifier information.

9. (Currently Amended) The device according to claim 1 [[2]], wherein the memory controller is configured to determine whether or not to approve the reception of the at least one ATM cell using receiving permission information of a receiving state table corresponding to VPI/VCI information attached to the at least one ATM cell, and to store the at least one ATM

cell in the linked cell buffer using a cell buffer identifier retrieved from a free cell buffer identifier queue.

10. (Currently Amended) The device according to claim 1 [[2]], wherein the memory controller is configured to retrieve another cell buffer identifier from a free cell buffer identifier queue, to store the received ATM cells, and to store a next cell buffet identifier in a next linked cell buffer identifier area provided in an area that stores a previous ATM cell, if the PT information of the received ATM cell is a predetermined minimum value [[0]].

11. (Currently Amended) The device according to claim 1 [[2]], wherein, in the memory controller, the cell number increases ~~by 1~~ and is stored in the receiving state table whenever the ATM cell is stored in the linked cell buffer.

12. (Currently Amended) The device according to claim 1 [[2]], wherein the data restoring unit is configured to compare a read pointer with a write pointer in the receiving completion state queue and to determine whether the at least one ATM cell is stored in the linked cell buffer.

13. (Currently Amended) The device according to claim 1 [[2]], wherein the data restoring unit is configured to retrieve a start cell buffer identifier from a receiving completion state queue, to store corresponding data stored in a cell buffer indicated by a start cell buffer identifier in the receiving data storage unit, and to decrease cell number information of the receiving completion state queue ~~by 1~~.

14. (Original) The device according to claim 13, wherein data are successively retrieved from the cell buffer and stored in the receiving data storage unit until the cell number becomes 0.

15. (Currently Amended) The device according to claim 1 [[2]], wherein the data restoring unit is configured to return the cell buffer identifier indicating each cell buffer to a free cell buffer identifier queue whenever retrieving data from the linked cell buffer.

16. (Canceled)

17. (Currently Amended) An ATM-based data communication method comprising:

reducing a message length value indicating a length of ~~included in~~ a message from a first calculation processing module ~~by one,~~ whenever one or more bytes of data are [[is]] fetched from the message ~~received from a first calculation processing module~~;

generating a first ~~at least one~~ ATM cell by ~~repeatedly performing a process of~~ combining a cell header made using Path Identifier/Virtual Channel Identifier (VPI/VCI) information included in the message and ~~48-byte~~ data bytes ~~extracted~~ from the message ~~until the message length value becomes 0~~; and

transmitting [[the] at least [[one]] the first ATM cell, wherein the message length value is reduced based on a number of data bytes in the first ATM cell, and when the number of data bytes in the message is greater than a payload capacity of the first ATM cell the method further comprises:

(a) generating an additional ATM cell by extracting additional data bytes from the message, the additional ATM cell generated based on the same cell header used to generate the first ATM cell, the same cell header including the same VPI/VCI and same payload type information as the first ATM cell;

(b) reducing the message length value based on the number of data bytes in the additional ATM cell; and

if the message includes additional data bytes not included in the first or additional ATM cells, repeating (a) and (b) until the message length value is reduced to a predetermined minimum value.

18. (Currently Amended) The method of claim 17, further comprising:

receiving each of the ~~at least one~~ additional ATM cells; ~~and~~

storing the received ~~at least one~~ ATM cells in a cell buffer using [[a]] cell buffer identifiers corresponding to respective ones of the stored ATM cells ~~that was previously stored~~;

retrieving the stored ~~at least one~~ ATM cells using the cell buffer identifiers,

restoring the message based on the retrieved ATM cells; and

informing a second calculation module of the restoration.

19. (Currently Amended) The method according to claim 17, further comprising:

changing the ~~setting~~ payload type (PT) information of an ~~the~~ ATM cell including a last data byte from the message from a first value to a second value [[1]] when the message length value is reduced to said predetermined minimum value ~~goes to 0~~.

20. (Currently Amended) The method according to claim 18, wherein receiving each of the additional ~~at least one~~ ATM cells comprises:

determining if the reception of the first ATM cell is approved, when the ~~a~~ first ATM cell ~~of the at least one ATM cell~~ is received;

when the reception of the first ATM cell is approved, storing the first ATM cell in a cell buffer indicated by a cell buffer identifier retrieved from a free cell buffer identifier queue,

increasing a cell number ~~by 1~~, and storing the cell number along with the first cell buffer identifier in a receiving state table;

when PT information included in the first ATM cell includes a first value ~~is 0~~, storing a next ATM cell following the first ATM cell in a cell buffer indicated by a next cell buffer identifier retrieved from the free cell buffer identifier, increasing the cell number by 1, and storing the cell number and the next cell buffer identifier in the receiving state table; and

repeating the previous step until PT information in a subsequently received ATM cell has a second value ~~is 1~~.

21. (Currently Amended) The method according to claim 20, wherein, when the next ~~second~~ ATM cell is stored in a cell buffer indicated by the next ~~second~~ cell buffer identifier, the next ~~second~~ cell buffer identifier is stored in a next linked buffer cell identifier area relative ~~which is provided~~ to a cell buffer in which the first ATM cell buffer is stored.

22. (Currently Amended) The method according to claim 20, wherein the cell number is indicative of a ~~the~~ number of ATM cells stored in the cell buffers corresponding to the message.

23. (Currently Amended) The method according to claim 18, wherein retrieving the at least one ATM cell and restoring the message comprises:

when all [[of]] ATM cells corresponding to the message are stored, retrieving the [[a]] first ATM cell using the first cell buffer identifier, storing the retrieved first ATM cell in a receiving data storage unit, reducing a cell number ~~by 1~~, and returning the first cell buffer identifier to a ~~the~~ free cell buffer identifier queue; and

if the cell number is not a predetermined value [[0]], repeatedly retrieving a next cell using a next cell buffer identifier stored in a next linked cell buffer identifier area relative ~~which is provided~~ to a cell buffer in which the first ATM cell is stored, storing the retrieved next cell in the receiving data storage unit, reducing the cell number ~~by 1~~, and returning the next cell buffer identifier to a [[the]] free cell buffer identifier queue.

24. (Currently Amended) An ATM apparatus comprising:

a first calculation processing module; and

a first data communication module coupled to the first calculation processing module, wherein the first data communication module includes:

a transmitter including~~, the transmitter includes~~: a data buffer configured to store a message from the first calculation processing module; a cell generator configured to generate at least one ATM cell from the message; and a cell transmitter configured to transmit the at least one ATM cell;

an ATM switch configured to relay the at least one ATM cell transmitted from the first data communication module;

a second calculation processing module; and

a second data communication module coupled to the second calculation processing module, wherein the second data communication module includes a receiver including: a cell receiver configured to receive the at least one ATM cell from the ATM switch; a memory controller configured to control storage of the at least one ATM cell received by the cell receiver in a memory; a data restoring unit configured to retrieve the at least one ATM cell from the memory and to restore the message; and a receiver buffer configured to store the message restored by the data restoring unit and to allow communication of the message with the second calculation processing module.

25. (Original) The apparatus of claim 24, wherein the cell generator is configured to divide data from the message into predetermined data portions and to combine each data portion with a cell header to form an ATM cell, and wherein the cell header is generated using Virtual Path Identifier/Virtual Channel Identifier (VPI/VCI) information of the message.

26. (Canceled)

27. (Currently Amended) The apparatus of claim 24 [[26]], wherein the memory comprises:

a linked cell buffer configured to store the at least one ATM cell and an identifier to a next linked cell buffer;

a free cell buffer identification queue configured to store at least one cell buffer identifier indicating at least one empty cell buffer;

a receiving state table configured to store information used for management of the at least one ATM cell; and

receiving completion state queue configured to copy a portion of information from the receiving state table when all ATM cells comprising one message are received and stored.

28. (Currently Amended) The apparatus of claim 27, wherein the information in the receiving state table includes at least one of:

approval information that indicates if the ATM cell is approved to be received;

a payload type that indicates if the ATM cell is a last cell of the message;

a cell number that indicates an order of the ATM cell among cells received for one message;

a start cell buffer identifier that indicates a linked cell buffer in which a first cell is stored for the message; ~~and~~ or

a last cell buffer identifier that indicates a linked cell buffer in which a last cell is stored for the message.

29. (Currently Amended) The apparatus of claim 27, wherein the receiving completion state queue includes at least one of cell number information or ~~and~~ start cell buffer identifier information.

30. (Original) The apparatus of claim 27, wherein the memory controller is configured to determine whether or not to approve the reception of the at least one ATM cell using receiving permission information of the receiving state table corresponding to VPI/VCI information attached to the at least one ATM cell, and to store the at least one ATM cell in the linked cell buffer using a cell buffer identifier retrieved from a free cell buffer identifier queue.

31. (Currently Amended) The apparatus of claim 27, wherein the memory controller is configured to retrieve a next cell buffer identifier from a free cell buffer identifier queue, to store a next received ATM cell, and to store a next cell buffer identifier in a next linked cell buffer identifier area provided in an area that stores a previous ATM cell, if payload type (PT) information of the received ATM cell includes a predetermined value ~~is 0~~.

32. (Currently Amended) The apparatus of claim 26, wherein the memory controller is configured to increase the cell number ~~by 1~~ and to store ~~stored~~ the cell number in a receiving state table if the ATM cell is stored in the linked cell buffer.

33. (Original) The apparatus of claim 26, wherein the data restoring unit is configured to compare a read pointer with a write pointer in the receiving completion state queue and to determine whether the at least one ATM cell is stored in the linked cell buffer.

34. (Original) The apparatus of claim 26, wherein the data restoring unit is configured to retrieve data from the memory and store the data in the receiver buffer to restore the message.

35. (Currently Amended) The apparatus of claim 34, wherein the data restoring unit is configured to sequentially retrieve data from the memory and to sequentially store data in the receiver buffer until a cell number indicator in the memory becomes a predetermined minimum value [[0]].

36. (Original) The apparatus of claim 34, wherein the message comprises message length information and user data.

37. (Original) The apparatus of claim 26, wherein the first data communication module further comprises a receiver and wherein second data communication module further comprises a transmitter.